

May 30, 2017

Doug Wall
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V1E 4N7

Re: Steep Slope Assessment for 2465 Waverly Drive, Blind Bay, BC; Legal Address: Lot 39, Section 18, Township 22, Range 10, Plan 25579, W6M, KDYD.

Introduction

At the request of Mr. Doug Wall, the contractor, on the behalf of Ms. Rose Fritz, the owner, Onsite Engineering Ltd. (OEL) has completed a steep slope assessment for the subject property noted above. It is our understanding that the property contains slopes in excess of 30%. As part of the development permit application process, the Columbia Shuswap Regional District (CSRD) approving officer requires that a Hazardous Lands (Steep Slope) Assessment be completed by a qualified geotechnical professional in order to quantify the level of hazard associated with steep slopes situated on the subject property.

The Electoral Area 'C' (South Shuswap) Official Community Plan Bylaw No. 725 (Bylaw No. 725) specifies that BC Building Code Schedule B and C-B forms are required to ensure geotechnical aspects of the project are overseen by a professional engineer. However, through the Procedures Bylaw the Manager of Development Services has made the interpretation and decision that a Steep Slope Assessment report will suffice for this property. If geotechnical recommendations beyond standard construction practices as per building code are made in the report, a post-construction field review and memorandum will be required.

Fieldwork at the site was completed on May 11, 2017 by Rod Williams, P.Geo., and on May 12, 2017 by Mike Burnett, EIT, of OEL. Field conditions at the time of the assessment were overcast and cool. The fieldwork consisted of a foot traverse of the subject property and adjacent areas with observations made of the terrain, soils, and drainage conditions.

Site Information

The subject property is approximately 0.12ha in size and is located in Blind Bay on the south shore of Shuswap Lake midway down the lower slopes of notch hill between highway 1 and the shoreline. The property slopes from southeast to northwest with the upper (southeastern) property line adjacent to Waverly Drive and the lower (northwestern) property line bordering a single family residence on the lower leg of Waverly Drive. All adjacent lots are developed.

Bedrock in the area is mapped as Cambrian to Silurian mudstone, siltstone, shale, and fine clastic sedimentary rocks of the Eagle Bay Assemblage. Bedrock was not observed in the field due to the presence of relatively deep surficial materials.

Surficial geology mapping for the area indicates that the surficial materials should consist of lacustrine deposits of silts, sand, and gravel which represent a mixture of deep-water and shoreline depositional environments. Surficial materials observed in several hand dug test pits on the property consist of a grey, firm, moist SILT some fine sand, (**ML**) which is consistent with the mapped surficial materials of the area.

The slope profile down the middle of the property starting from the edge of Waverly Drive contains a ditch approximately 3m wide by 0.5m deep, follow by gentle slopes of 0-5% gradient for approximately 10m, the terrain then breaks over to 35% for approximately 17m before transitioning to a 21% slope for 11m which continues to the northwestern edge of the property. Carrying onto the adjacent property the slope continues at a grade of approximately 12% for 7m before encountering a stepped landscape wall. A slope profile is shown in Figure 3.

Terrain on the subject property has been disturbed due to recent and past clearing activities and construction in the area. There is a possibility that a small amount of fill was pushed over the crest of the slope of the property during the initial development of the area to make more level terrain along the road. Short, steeper slopes up to 65% are present along the side boundaries of the lot and appear to be remnants of small ridges that may have been locally over steepened by fill placement. The proposed house location will not affect or be affected by these slopes.

No surface flows run through the property and no indicators of significant seepage or shallow subsurface flows were observed on the site. With the property being situated along the top of a prominent ridge line located approximately 180m from where the ridge ties into the main slope of the hill side, it can be expected that the proposed building location will not see any significant ground water flows. It is possible that the lower slopes on the property may intercept subsurface flows during the spring freshet indicated by the prevalence of cedar trees on the lower slopes of the property.

It is our understanding that the property owner intends to construct a single family residential structure with an attached garage. A rough layout of the house overlain the topographic survey has been provided by Blackburn Surveying Ltd. and shows the house partially situated over the sloping area. The site is suitable for a daylight basement design with the lower level on the slope. At the time of writing this report no detailed design of the building has been provided showing size or elevation views of the footings.

An on-site sewerage system is proposed on the lower gentler slopes of the property. The system has been designed by Franklin Engineering Ltd. It is our understanding that the dispersal field has been design with consideration for the expected low infiltration rates in the SILT some fine sand soils present on this site. Provided that the hydraulic loading rate does not

Assessment of Landslide Hazard

Discussion & Results

The current assessment process was triggered by the presence of slope gradients exceeding 30% within the subject property. In this case, the terrain generally consists of 21-35% gradient slopes throughout the property with a bench of 0-5% located on the southeastern side of the property.

Steeper slopes flank the property along the sidelines and may be partially the result of reworked materials. The site is suitable for a level entry with a walk out basement with standard strip footings. **It is our assessment that the likelihood of a landslide occurring within the subject property with the potential to impact the proposed building site following the proposed construction is very low.** A **low likelihood** means that the event is conceivable but only under exceptional circumstances. Quantitatively, the probability of a landslide is estimated as $< 1/500$ annual probability. This rating is based on:

1. The predominantly moderate gradient slopes on the subject property;
2. The lack of surface flows or indicators of significant subsurface flows on the property; and
3. The lack of any indicators of slope instability observed in the area.

With reference to the assessed low likelihood of a landslide it is our determination that the property may be used safely for the use intended.

Closure

This assessment has been carried out in accordance with generally accepted geotechnical practice. Conclusions and recommendations presented herein are based on visual site inspections. Assessments of soils and slope stability are based on interpretation of surface features and limited sub-surface investigation; actual ground conditions may vary from those inferred. Variations (even over short distances) are inherent and are a function of natural processes. OEL does not represent or warrant that the conditions listed in the report are exact and the user should recognize that variations may exist.

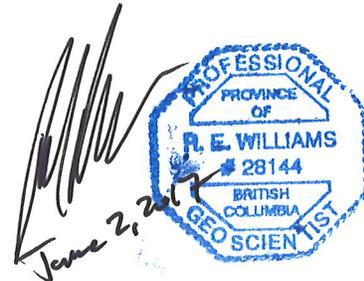
We trust that this report satisfies your present requirements. Should you have any questions or comments, please contact our office at your convenience.

Sincerely,

Onsite Engineering Ltd.

Prepared by:

Mike Burnett, EIT
Junior Engineer



Rod Williams, P. Geo.
Senior Geoscientist

Encl:

Figure 1: Location Key Map

Figure 2: Plot Plan

Photos 1-4



Figure 1 Location Key Map

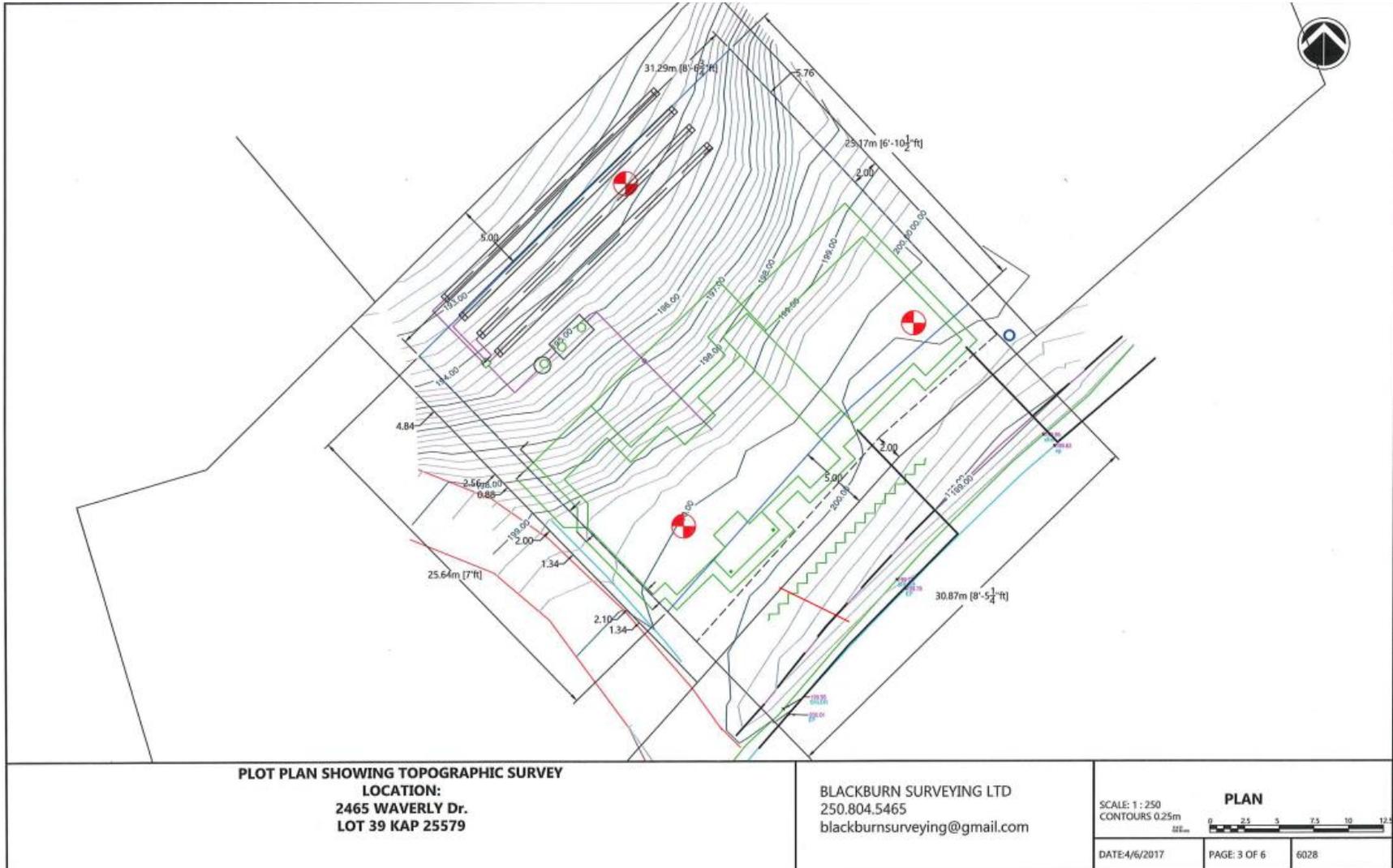


Figure 2 Plot Plan of the proposed development prepared by Blackburn Surveying Ltd.

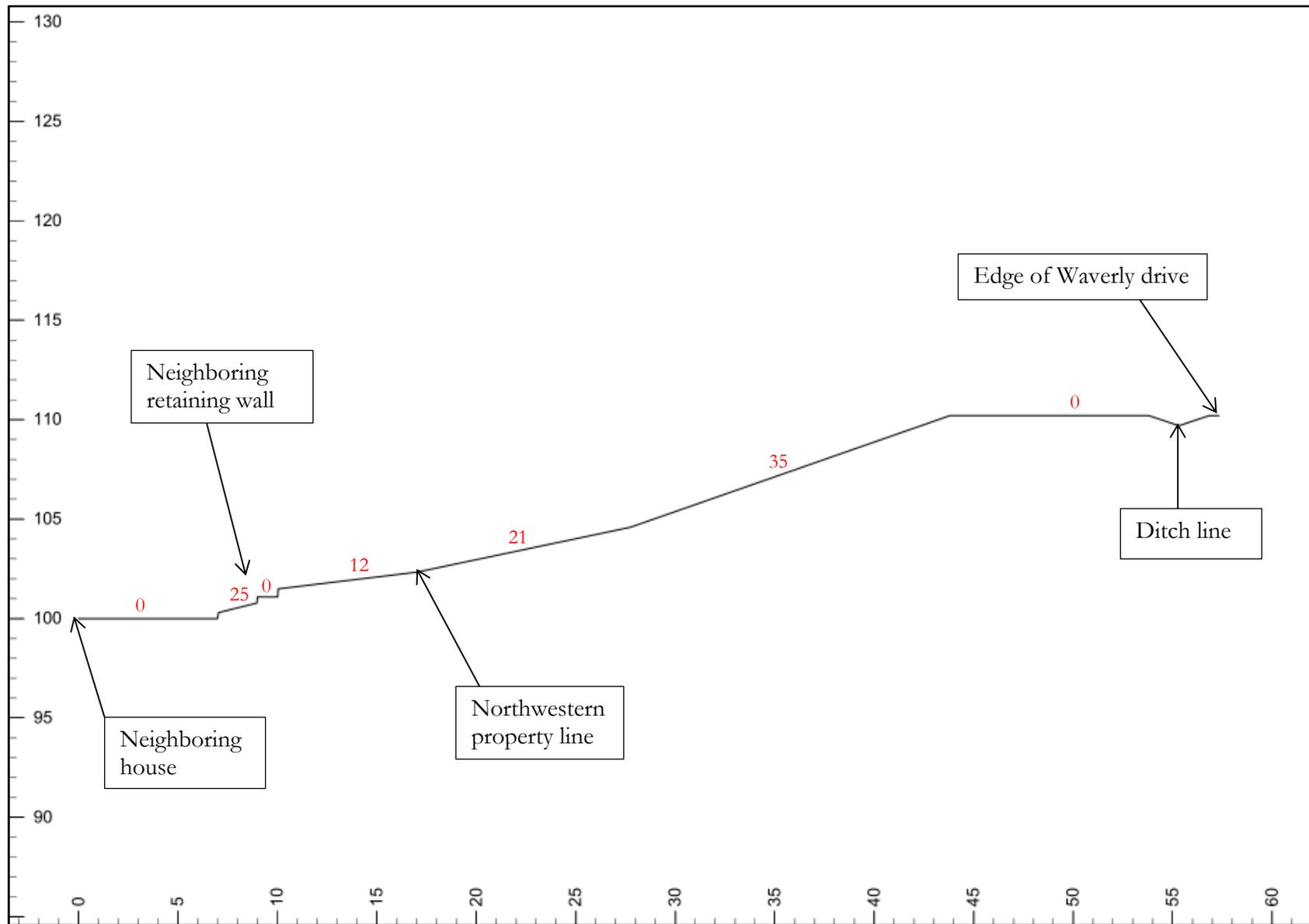


Figure 3 Slope Profile. Distances along both axis are in meters and slope gradients are in % gradient.



Photo 1 The proposed building site, looking northeast.



Photo 2 Northwestern edge of proposed building site and lower slopes of the property, looking southeast.



Photo 3 Soil profile on the property consisting of firm SILT some fine sand



Photo 4 View of the lower slopes of the property from the neighboring lot